



## **Enhancing the ecological and functional roles of shade trees in cocoa farms participatory tree diversification in Ghana**

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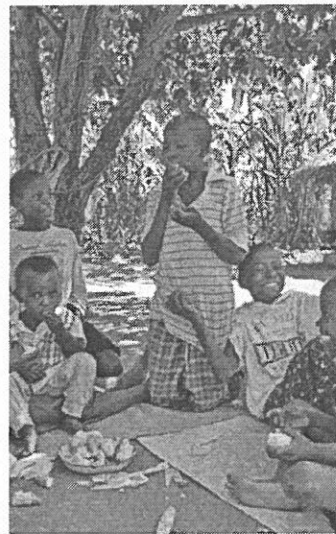
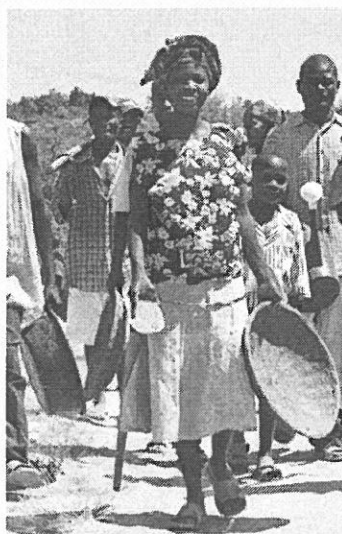
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## Book of Abstracts



*Agroforestry - The Future of  
Global Land Use*

## Comparative analysis of farmers' knowledge about ecosystem services and coffee productivity across Central America

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**Session** 26. Local knowledge in agroforestry science

**Abstract** The extent to which coffee agroforestry systems provide ecosystem services depends on local context and management practices. There is a paucity of information about how and why farmers manage their plantations in the way that they do and the local knowledge that underpins this. This research compares knowledge from coffee-growing areas bordering key forest reserves in Nicaragua, Costa Rica and Guatemala. Knowledge was acquired from over 170 farmers in a stratified purposive sample, using established knowledge based systems methods. Farmers in all 3 countries had detailed knowledge about how trees affected ecosystem services such as soil formation, erosion control, provision of wildlife habitat and water conservation. Links between trees and biodiversity, pollination, biological pest control and micro-climate regulation were understood, and species were classified according to their role in both providing and regulating services. Trees were said to produce 'fresh' shade that was suitable for coffee or 'hot' shade that was not suitable. This was explained in relation to leaf texture and size; foliage density, crown shape and root system attributes. Much of the local knowledge about how trees could improve provision of ecosystem services, however, was not practically applied because farmers were concerned that increasing levels of shade would decrease yields. A range of trees and shrubs were maintained in coffee plantations at all sites but different tree species were dominant and diversity varied two-fold amongst sites. The degree of shade tolerated was the main difference across countries and this was strongly related to socioeconomic factors such as the prevailing demand for fuelwood. Comparative analysis allowed us to identify generally applicable knowledge across sites as well as the key factors that determine how knowledge was locally applied.

## Enhancing the ecological and functional roles of shade trees in cocoa farms: participatory tree diversification in Ghana

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**Session** 26. Local knowledge in agroforestry science

**Abstract** In West Africa, the diversity and density of non-cocoa trees in cocoa farms is frequently the result of farmers managing natural processes of regeneration in forest-fallows. On-farm species diversity and the ecological and functional value of shade trees is therefore more a result of chance and uncoordinated decisions over a long period rather than advanced planning. In addition, there is wide variation in farmers' knowledge of the dynamics and interactions of different tree species as they occur in managed cocoa landscapes. Relying on natural regeneration processes can limit farmers' ability to select desirable species or arrange their distribution in time and space. Hence, the potential of diverse cocoa growing systems is limited in its ability to enhance productivity, while making significant contributions to household incomes or conservation of biodiversity on farm and in the surrounding landscape. This paper presents evidence from a study in 89 cocoa farms which shows that farmers in Ghana's Ashanti Region are planting cocoa in fallows and degraded forest environments, but primarily rely upon forest regeneration processes to establish shade in their cocoa farms. It then demonstrates how shade management is limited by: 1) an inability to intentionally choose desirable species; 2) an inability to deliberately arrange non-cocoa trees within farms; and 3) variation in farmer's knowledge of shade trees. As a